

AD-A256 596

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Form Approved
OMB No. 0704-0188

2
2

2 average / hour day estimate, including the time for reviewing instructions, searching existing data sources, and the collection of information. Send comments regarding this burden estimate or any other aspect of this report to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302.

DATE

28/05/92

J. REPORT TYPE AND DATES COVERED

MONOGRAPH

4. TITLE AND SUBTITLE

THE CIVIL RESERVE AIR FLEET... A VIABLE STRATEGIC
Airlift Asset in the Year 2000?

5. FUNDING NUMBERS

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION
REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING
AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

13. ABSTRACT (Maximum 200 words)

SEE ATTACHED

DTIC
SELECTED
OCT. 27, 1992
S B D

14. SUBJECT TERMS

TRANSPORTATION, AIRLIFT, C-17

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION
OF REPORT

UNCLASSIFIED

18. SECURITY CLASSIFICATION
OF THIS PAGE

UNCLASSIFIED

19. SECURITY CLASSIFICATION
OF ABSTRACT

UNCLASSIFIED

20. LIMITATION OF ABSTRACT

UNLIMITED

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
GPO: 1984 O-102

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THE CIVIL RESERVE AIR FLEET (CRAF).... A VIABLE STRATEGIC AIRLIFT ASSET IN THE YEAR 2000? by LTC Donald C. Olson, USA, 52 pages.

This monograph discusses the potential for a strategic airlift strategy-capabilities mismatch by the year 2000 as the Department of Defense reduces and restructures its ground, air, and sea forces and concurrently refocuses its strategy for the next decade. This monograph examines the projected roles, missions, and capabilities of a fiscally constrained force operating within the framework of a dramatically reshaped National Security Strategy. The focus of this monograph is narrowed to primarily review the rapid force projection mission of the Army and the capability of the air cargo system to respond rapidly to it.

The monograph first briefly examines the history of the first forty years of the Civil Reserve Air Fleet (CRAF) and its support to the Military Airlift Command (MAC) then culminates with its call to duty and performance during Operation Desert Shield and Desert Storm. Next, it examines the projected mobility requirements for the next decade and the start of the next century.

The potential for a strategy-capabilities mismatch was examined by comparing the balance between the requirement to maintain an efficient, modern, and combat-ready active duty air force fleet, the potential CRAF contribution, and the need for a strong U.S. civil aviation industry. The U.S. will have a strategy-capabilities mismatch unless the Department of Defense provides increased priority to the mobility triad.

The Civil Reserve Air Fleet...A Viable Strategic Airlift Asset in the Year 2000?

A Monograph
by

Lieutenant Colonel Donald C. Olson
Aviation



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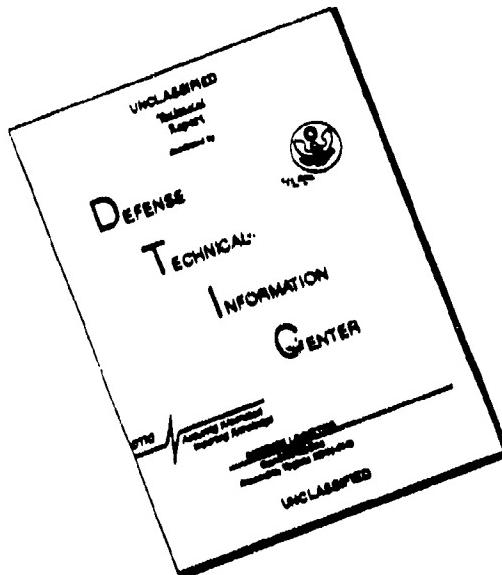
92-28097

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MONOGRAPH APPROVAL

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Title of Monograph : The Civil Reserve Air Fleet (CRAF)....A Viable Strategic Airlift Asset in the Year 2000?

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DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
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Distribution/	
Availability Codes	
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DTIC QUALITY INSPECTED 8

Accepted this 3rd day of June 1992

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I. INTRODUCTION

The 100-hour success of our ground forces in the war to liberate Kuwait was stunning, but we should not allow it to obscure the fact that we required six months to deploy those forces. As our overall force levels draw down and our forward-deployed forces shrink, we must sustain and expand our investment in airlift, sealift, and - where possible - prepositioning. (1)

The worldwide political environment is in the midst of one of the most dramatic and potentially one of the most destabilizing periods in modern history. The four fundamental demands of the new era are clear: to ensure strategic deterrence, to exercise forward presence in key areas, to respond effectively to crises and to retain the national capacity to reconstitute forces should this ever be needed. (2) The ability of the United States to rapidly deploy forces to any region of the world to respond to a crisis is the key challenge of the next decade.

The United States continues to reduce its troop strength and in some cases totally withdraw its forces from forward deployed locations around the globe. Significant overall force structure reductions are closely tied to the reduction in forward deployed forces. The two corps structure in Europe has already been reduced to one corps with two divisions. Force reductions and realignments are gaining momentum due to economic pressures in the United States and the diminishing worldwide threat posed by the former Soviet Union (Commonwealth of Independent States).

Only eighteen months ago, there was tremendous pressure to quickly draw down the U.S. military forces to realize a quick "peace dividend." Communism

and the Warsaw Pact were disintegrating and German unification appeared assured. Six months later in August 1990, the world's attention focused on Saddam Hussein's invasion of Kuwait. In the midst of unprecedented force structure reductions, the U.S. began its most intense deployment of troops and equipment in its history. Overall reduction in the size of the force, however, has not reduced the requirement for combat readiness for a myriad of worldwide contingencies for heavy and light forces.

This monograph will look at the impact of recent changes in the U.S. National Security Strategy compared with the projected roles, missions, and capabilities of the force by the year 2000. A much smaller continental U.S. (CONUS) based force will require significant lift and sustainment support from the mobility triad; airlift, sealift, and prepositioned stocks. The focus of this paper is narrowed to primarily review the potential for a strategy-capabilities mismatch between the rapid force projection mission of the Army and the capability of the air cargo system to respond rapidly. The ground transportation component will not be addressed in the context of this monograph.

Mobility is an integral element of the U.S. global military strategy since it is the causa sine qua non (main contribution) for projecting U.S. military power, sustaining deployed forces, and meeting contingency requirements anywhere in the world. (3) One of the biggest concerns becomes the capability for conventional force projection with a restructured force. Transportation system capability and efficiency are only issues if the factor of time stresses the operation. An efficient and productive transportation system is clearly needed. A time constrained and underfunded system is not an acceptable alternative. The

U.S. cannot afford to have a system that reaches this level of budget-induced mediocrity.

We must have a strong, capable, mobility triad to ensure the deterrent value of U.S. power is not decreased in the eyes of possible belligerents as we reduce forward presence in some regions of the world. All of the legs of the mobility triad provide valuable contributions to the overall transportation system. Cost benefit comparisons of airlift, sealift, and prepositioning encompasses opportunity costs. Early arrival of even a few forces could be a determinant in deterring an attack in the first place, or in dissuading an attacker from continuing his aggression. Time is the critical element when trying to measure cost-effectiveness of the airlift and sealift systems and the contribution prepositioning makes. While well conceived maritime prepositioning programs can reduce some airlift and sealift requirements, they do not necessarily provide for early arrival and could detract from tactical flexibility if the linkup occurs where the marriage of troops and equipment is difficult.

The U.S. needs a balanced program of airlift, sealift, and prepositioning to have assurances of success in deterring or defeating a potential adversary in the Persian Gulf region, Europe, Korea, South America, or elsewhere. (4) Airlift is the key for rapid deployment to crisis areas with sufficient troop strength and equipment to be credible and to quickly terminate hostilities. The health of both our organic airlift capability and the civil airline industry is necessary to support this conventional strategy. (5) Sealift provides the follow-on forces, equipment, and sustainment base needed for extended operations. The Army is postured to rapidly deploy combat-ready forces worldwide. This is vividly demonstrated in

unit deployment planning and periodic conduct of unannounced Emergency Deployment Readiness Exercises. These exercises and actual combat deployments to Grenada, Panama, and the Persian Gulf have shown the high levels of deployment and combat readiness units maintain. Do we have the right combination of air and sealift capable of meeting the challenges that may face the U.S. in the last half of the 90's and into the next decade?

Airlift provides the capability to project Army forcible-entry forces to establish a rapid presence anywhere in the world and to transport soldiers and high priority cargo to theaters of operation. Retention of sufficient numbers of worldwide lift aircraft is essential to the effective execution of the National Military Strategy. (6) Airlift is the critical link in achieving U.S. policy objectives, but mobility studies indicate there are significant airlift shortfalls to support the current U.S. National Security Strategy. (7)

This mobility shortfall is not new. The principle cargo aircraft shortage is the wide-body 747 and DC-10 style airframes. Although sealift is projected to carry 90-95 percent of all requirements at day 120 of a conflict, airlift will provide 100 percent of all requirements through day 15 and approximately 50 percent on day 20. (8) The mobility shortfall has always been an accepted reality. The Military Airlift Command (MAC) has had a plan relying on force modernization and the Civil Reserve Air Fleet Program (CRAF) to meet the strategic air cargo goals of the year 2000. The U.S. Air Force Master Airlift Plan has been an optimistic one that put its emphasis on the C-17 program first and then the CRAF.

The CRAF program is a valuable contributor to U.S. national defense

plans but rests in the shadow of the organic U.S. Air Force fleet. CRAF needs continued support and emphasis as an active partner in the Air Force restructuring after its successful support of Operation Desert Shield/Storm.

II. THE CIVIL RESERVE AIR FLEET

President Truman expressed his concerns over the requirements for air transport as early as 1951. This was a result of his observations of military air transport during World War II and the Berlin Airlift. The Civil Reserve Air Fleet (CRAF) was formed at his direction to augment military air transport. The seldom heard of War Air Service Program (WASP) complements CRAF in a national emergency which substantially constrains the air transportation system. The WASP remains a program designed to allocate air service in times of extreme national emergency by prioritizing all aircraft in the U.S. WASP goes well beyond CRAF, and addresses the nation's needs in an all-out war when much of the nation's industrial production and transportation capacity is needed to support a total war effort. The WASP is administered by the Department of Transportation (DOT). (9)

In 1960, President Eisenhower approved actions that further strengthened the relationship between the Department of Defense (DOD) and the civil air sector. These actions specified maximum reliance on the civil airlift where appropriate and actions to ensure a strong civil airlift industry capable of rapid response in support of military deployments. This was designed to be in response to a national crisis. (10) Specific authority for pre-allocating aircraft by the DOT is granted in the Defense Production Act of 1950 for a Stage III national emergency. Initially, the contract only envisioned one stage of CRAF, Stage III. It was revised to its current three stage program after the experience of the Cuban Missile Crisis. (11)

The Military Airlift Command (MAC) developed a staged mobilization system to phase civil aircraft into the MAC system in the event of an emergency. A Memorandum of Understanding (MOU) signed in 1963 by DOD and the Department of Commerce outlined the three activation stages of CRAF (12). This MOU was reaffirmed by a DOD and DOT Memorandum of Agreement (MOA) signed in 1987 further defining the CRAF program and the activation stages. A short summary of the three stages of CRAF follow.

CRAF Stage I—Committed Expansion. This stage involves DOD use of civil air resources that the air carriers will furnish to DOD to support substantially expanded peacetime military airlift requirements. The Commander-in-Chief Transportation Command (CINCTRANSCOM) may authorize activation of this stage. Aircraft must be at their on-load site within 24 hours after mission notification.

CRAF Stage II—Airlift Emergency. This stage involves DOD use of civil air resources that air carriers will furnish to DOD in time of defense airlift emergency that does not warrant national mobilization. The Secretary of Defense (SECDEF) activates CRAF Stage II. The response time remains 24 hours.

CRAF Stage III—National Emergency. This stage involves DOD use of civil air resources that the air carriers will furnish to DOD in the time of declared national defense-oriented emergency or war, or when determined by the President or Congress to be necessary for the national defense. The SECDEF activates CRAF Stage III. The response time is 48 hours.

Note: In addition to the three stages of CRAF activation, an additional "preliminary stage" is available for day-to-day peacetime augmentation to DOD. This stage is called Peacetime Commercial Augmentation. It is supported through commercial contracts with MAC. (13)

Peacetime Commercial Augmentation is the routine way MAC passenger traffic and some cargo traffic move on a day-to-day basis in peacetime. Air carriers are awarded peacetime contracts based on a formula that relies primarily

on their voluntary contribution to the CRAF program. The CRAF Program, although formed in 1952, had never been activated prior to the 1990 Gulf War buildup. All previous major military crises were performed using organic MAC assets and through commercial contracts with carriers that volunteered their support.

The DOD and the DOT, operating under a CRAF MOU and MOA, are jointly responsible for the CRAF program. DOT allocates aircraft to DOD; allocation means designation for DOD use with legal protection to carriers. DOD is responsible for determining the numbers and types of civil aircraft needed in the CRAF program. (14) CINCMAC (dual-hatted as CINCTRANSCOM) is the DOD executive agent for airlift within the DOD.

It is not easy in an ever changing world to project airlift requirements. Since the early 1970s, more than 20 major mobility studies compared established requirements to an airlift capability. In every case, airlift requirements far exceeded available airframes. (15) A classified post-Desert Storm Mobility Requirements Study was recently completed. The most significant study of strategic airlift prior to Operation Desert Shield/Storm was the 1981 Defense Authorization Act directed Congressionally Mandated Mobility Study (CMMS). The CMMS is the benchmark study which established the airlift goals for the 1980s and 1990s based on a series of worldwide contingency scenarios. The study estimated requirements as high as 150 million-ton-mile/day (mtmld) for an all out war in Central Europe (NATO) to 98 mtmld for a regional conflict in the Persian Gulf. Primarily because of fiscal constraints, the study recommended DOD establish the cargo airlift capability goal to 88 mtmld. The overall airlift

capability at the time the study was published was 48 mtnld (18).

A major concern of TRANSCOM is ensuring the maximum amount of civil cargo aircraft volunteer for the CRAF program. Passenger aircraft support traditionally has never been a problem. TRANSCOM's ability to capture the bulk of available commercial cargo capability into the CRAF program rests on the value of the contracts it lets as part of the Peacetime Commercial Augmentation Program and some legislative flexibility it did not have earlier in the program.

(17) According to MAC estimates in 1989, MAC spends about \$600 million a year for airlift services provided by commercial airlines for routine movement of troops and equipment. (18) MAC has worked hard to provide incentives to draw voluntary participation from the commercial air carriers.

Profit provided through commercial contracts is the most attractive incentive but does not necessarily increase the size of the commercial cargo fleet. Long-range international aircraft, which make up most of the CRAF, must meet certain military payload criteria. For instance, aircraft used for strategic missions must have extended over-water capability, FAA approval to operate internationally, and four aircrews assigned per airplane. In addition to these requirements, cargo aircraft must have a rail and locking system with dimensions that are compatible with military pallets. These criteria eliminate many aircraft from consideration. (19)

The reduction in the number of forward deployed forces and the overall reduction in the size of the force may reduce commercial contracts and the associated attractiveness of the program to civil air carriers. TRANSCOM has offered a variety of other incentives to try to increase the mtmld capability in the

commercial sector. These incentives include the CRAF Enhancement Program, Joint Ventures, Multiple Year Contracts, and improvements in the Senior Lodger Arrangement.

The CRAF Enhancement Program was designed to incorporate cargo convertible features on existing and new commercial passenger aircraft. The program added convertibility to 23 wide-bodied passenger aircraft. They have been nicknamed "combi" jets. This alone has increased the commercial air cargo contribution to more than 18 mmtkd during full mobilization, approximately one-third of DOD's total 48 mmtkd cargo capability. It would have cost nearly \$10 billion to replace this capability with organic military capability, which does not include annual operating costs. (20)

The CRAF Enhancement Program provides significant capabilities increases to the air cargo system but there is a reluctance on the part of industry to participate in the program. Participants are compensated for direct and indirect costs of modification, such as the flight to and from the modification site, time the aircraft is out of service, and additional annual fees for the 12 or 16 year duration of the CRAF Enhancement Program. The aircraft conversion increases operating costs because of the increased weight. The entire program had cost an estimated \$635 million by 1990. (21)

Joint Ventures were designed to bring in primarily smaller carriers and the overnight package carriers that could not meet the requirement for four crews per airframe or who did not meet the legal definition of an air carrier. Multiple year contracts have expanded the annual contract to a three year contract. This provides some stability to the carriers and allows them to program long lead time

aircraft purchases with more vision and certainty. Most air carriers originally bargained for a five year contract but agreed to the three year provision.

The Senior Lodger Arrangement provides support to the commercial carriers operating off their normal line in support of DOD. This means that the primary carrier at a particular airfield agrees to provide services to all other CRAF aircraft not represented on the airfield. The Senior Lodger Arrangement needs additional clarification for airfields not routinely serviced by any of the U.S. carriers for all the flight planning, turnaround support, and coordination for international flight clearances. A situation that could reasonably be expected in some contingency scenarios.

The commercial air cargo sector is not capable of satisfying DOD outsize cargo requirements nor is it sufficient to meet DOD bulk and oversize requirements. The primary focus of DOD efforts to increase airlift capability has been in the cargo arena. The rewinged C-5A, the stretched C-141, the C-5B, the KC-10, and soon the C-17, provide the core airlift capability. This is particularly true during the early stages of deployment into austere locations or into areas where hostilities have begun. (22) It is critical that DOD and the commercial carriers continue to search for incentives that make good business sense for private industry, as well as benefit the overall national security of the United States. Some examples of additional incentives will be addressed later in this paper. A balance must be struck between the size of the organic MAC fleet, their requirement to maintain pilot proficiency, budgetary constraints, and the health and vitality of the U.S. commercial air carriers.

The airline industry is entering a dynamic decade. Mergers, expansion,

leasing, growth of new segments, and tailoring of fleets to routes have characterized the dynamic nature of an industry seeking increased productivity, efficiency, and profitability. (23) On the down side, the dynamics that impact the airline industry have caused some of the major carriers and most of the smaller carriers created after airline deregulation to declare bankruptcy or to be merged with stronger companies. The transfer of ownership or operators because of a merger does little more than demand additional manpower to track the actual disposition of particular tail numbers. In most cases, the commitment remains in force with no break. Bankruptcies offer more problems, but even those aircraft make the transition, and none have been lost so far. (24)

The precarious financial situation of some carriers is closely monitored by TRANSCOM. One of the most recent examples was a dispute between Delta Airlines and the Air Force resulting from Delta's purchase of some of the bankrupt Pan Am World Airways fleet. The Air Force contended Pan Am had reneged on a deal to provide CRAF support to MAC for their aircraft that had gone through the CRAF Enhancement Program. The Air Force spent \$465 million on the airframes. Delta and the Pentagon agreed in principle to a deal in which Delta will pay the Air Force \$5 million and provide \$20 million in credits for future plane use. The biggest part of the agreement was Delta committing 42 long-range planes to the CRAF. (25)

From a national security standpoint, a strong CRAF program is essential and one of the nation's most cost effective defense programs. The U.S. National Airlift

Policy was signed by President Reagan in late June 1987. It superseded the previous policy signed in 1960. This directive recognizes the interdependence of military and civil airlift and directs executive agencies to pursue actions to strengthen our national airlift capability with particular emphasis on maximizing the contribution of the civil sector to reduce our airlift shortfall. (26) This policy is key to the role CRAF will play in supporting U.S. national security. The intent of the policy is open to a variety of interpretations. Some selected objectives directly from the National Airlift Policy, NSDD 280, follow:

1. U.S. policies shall be designed to increase and improve the organic airlift capability of MAC, as well as maximize the mobilization base of the commercial air carrier industry.
2. Readiness of MAC must be maintained while promoting the growth and economic stability of the commercial air carrier industry.
3. A financially sound commercial air carrier industry must be relied upon to provide capability required beyond that of organic military aircraft.
4. In the broader interest of national security requirements, a level of commercial cargo airlift augmentation is required in peacetime consistent with the need to promote a viable civil reserve air fleet and provide training within the military airlift system.
5. U.S. aviation policy, both international and domestic, shall be designed to strengthen and promote the global position of the U.S. aviation industry and in turn, enhance the airlift capability of the nation. (27)

The Air Force Airlift Master Plan is the program to translate overall airlift requirements into the optimum force structure, considering airlift needs and fiscal realities. (28) Our cargo airlift shortfall is big. There are not enough long-range, cargo-capable aircraft in the U.S. inventory to satisfy our needs. It is unrealistic to assume we can solve our cargo airlift problems solely with civil aircraft. The civil airlines do not buy aircraft because DOD has an airlift shortfall. They purchase to

meet market demands. (29) The issue becomes one of cooperation and shared responsibility in meeting the overall goal of providing sufficient cargo airlift to meet the U.S. strategic objectives. The civil air carrier industry has the potential to contribute significantly more to the CRAF program, with sufficient incentives, without infringing on Air Force modernization efforts or combat readiness. Under MAC's Airlift Master Plan involving organic C-17, C5-B, KC-10, and C-141B aircraft, there would be a substantial shortfall in attaining the 66 mtmld goal. CRAF is viewed as an important way in which to reduce that shortfall. Its Stage III contribution is approximately 17.5 mtmld. (30)

There are several key points as we continue to look at the strategic airlift needs of our nation:

1. Force projection is a vital portion of our national defense posture.
2. The strategic airlift goal of 66 mtmld is a fiscally constrained, reasonably attainable goal with sufficient resourcing.
3. The C-17 is the cornerstone of the Air Forces drive to meet the 66 mtmld goal.
4. The CRAF is an economical and viable means to augment our organic force and greatly enhances our strategic airlift capability in the event of a national emergency. (31)

A major focus of the National Airlift Policy was to ensure a close relationship existed between MAC and the civil air carrier industry. Civilian industry can make a greater contribution to the air cargo requirements of DOD. The issue is primarily one of economics. The industry has lost a considerable amount of cargo space as a result of environmental restrictions on the industry. The increase in the overnight package business has significantly changed the nature of the U.S. cargo industry. The overnight package carriers, while considered

cargo haulers, do not have the same cargo space and stowage requirements the military needs.

The Air Force is facing force structure cuts, delays in the C-17 program, and an aging cargo fleet that is rapidly reaching retirement age. These issues will cause our cargo lift capacity to miss the 86 mtmld goal by the year 2000. The CRAF contribution to cargo airlift is projected to remain at its current mtmld capability through 2000 while the organic Air Force capability will probably decline slightly rather than increase slightly as projected in the fall of 1991. (See Appendix A.)

The civil sector needs assurances of long term profitability before they can commit to adding wide-bodied military-compatible aircraft to their fleets or to adding convertible features to their current fleets. Procurement lead time can often reach 10 years for large aircraft. The civil sector now carries over 95 percent of the MAC passenger cargo on regularly scheduled routes (channels) but carries less than 25 percent of the MAC cargo traffic. The civil air carriers are perfectly suited to accepting a greater portion of MAC's channel traffic cargo requirements as the Air Force restructures. This would allow MAC to focus on outsized cargo, sensitive cargo, and pilot training.

The increased CRAF cargo channel traffic would fulfill one of the National Airlift Policy objectives of expanding our civil air carrier international market share while contributing to the national defense. The issues of MAC pilot training and combat readiness are important considerations that could be tailored on a more equal footing with the training of our CRAF crews. CRAF could develop the capability to fill gaps caused by delays and reductions in the C-17 procurement

and the scheduled retirements of many of the C-141Bs.

Responsiveness to a crisis and airlift operations in hostile areas of the world remains critical when identifying the right balance of organic aircraft and CRAF aircraft. MAC has always been able to meet requirements that exceeded organic capacity through Peacetime Commercial Augmentation. The ability of the U.S. to support and sustain troops in contingency regions void of a forward U.S. presence or prepositioned equipment is a critical implied task in the National Security Strategy of the United States. The nation never had to call on the CRAF capability until mid-August 1990 when CINCMAC, with the approval of the Secretary of Defense, activated CRAF Stage I as part of the U.S. buildup in the Persian Gulf in response to Iraq's invasion of Kuwait. Surge requirements for airlift and in-country reception capabilities significantly stressed the ability of MAC to move the initial force quickly enough and link up soldiers with equipment that deployed by sea. (32) The CRAF system developed in the 1950's — but never tested — was about to receive a severe test.

III. DESERT SHIELD / DESERT STORM IMPACT AND IMPLICATIONS

The timing of events was almost entirely up to the U.S. and its allies. This affected demands that were made of airlift and sealift. Iraq's passivity gave TRANSCOM more leeway than it could have expected. Major decisions could be made after assessing whether logistics support was adequate, and any or all of them could have been delayed within reason, if necessary. (33)

The total CRAF program in the Fall of 1990 included 506 aircraft from 29 carriers that were voluntarily participating in the program when the Department of Defense activated CRAF Stage I to support the Persian Gulf buildup. (34) Each aircraft in CRAF is assigned one of five mission segments: long-range international, short-range international, Alaskan, domestic, and aeromedical (See Appendix B). This monograph focuses only on the long-range international CRAF segment. MAC is responsible for mission tasking but each air carrier retains responsibility for mission execution using its internal corporate structure.

Desert Shield began the largest airlift effort in history -- larger than the Berlin Airlift; larger than the peak airlift operations in Vietnam, and larger than the 1973 Israeli airlift. (35) The total airlift capability both for organic aircraft and CRAF was approximately 48 mtn/d; interestingly the capacity had only increased 2 mtn/d since the 1981 CMMS. Prior to Stage I activation in mid-August, U.S. airlines voluntarily accounted for 39 missions in support of Desert Shield. It soon became apparent that civil air carrier volunteers would not be sufficient to meet the rapidly increasing airlift requirements both for passengers and for cargo. There had always been enough CRAF volunteers in previous crises to meet the DOD needs; that was not the case for Desert Shield/Storm. The mission requirements were too great (See Appendix C).

CINCMAC ordered the first implementation of the CRAF system in its nearly 38 year history in August 1990. Stage I activated 38 aircraft from 16 air carriers to mainly transport passengers. The CRAF included McDonnell Douglas DC-8s, DC-10s, and MD-80s; Boeing 707s, 727s, 737s, 747s, 757s, and 767s; Lockheed L-1011s, and Air Bus A-310s. (36) Stage II was activated on 16 January 1991—the day Desert Shield became Desert Storm—and increased the number to 181 aircraft. However, the SECDEF called for only 117 long-range cargo aircraft from that pool. (37) In CRAF Stage III, in which full activation levels would be 506 aircraft, the reduction in long-range commercial passenger capacity would be 57 percent and more than 80 percent in the cargo capacity. (38)

The activation of Stage I came at the peak of the summer tourist season in the United States and was projected to continue into the fall and winter holiday season. The potential loss of passenger traffic and market share during traditional high density passenger utilization periods for both domestic and international routes was an industry-wide concern. International tension at the time of activation minimized the impact of the diversion of commercial aircraft to the DOD. The converse of these concerns, however, was also true for several carriers experiencing financial downturns in a recession period. Those carriers welcomed the increased revenues from the commitment of airframes to DOD. The number of commercial airline crews that were called to active duty to support the superb effort of the Air Force Reserve and Air National Guard was another concern that ultimately did not turn out to be a major problem for the Gulf War. This total, however, did reach as high as 20 percent in some airlines. (39)

Under full mobilization, the CRAF provides 30 percent of DOD's cargo

capability and 95 percent of its passenger lift. (40) The activation of CRAF Stage I only constituted about 4 percent of the U.S. long-range passenger capacity and about 19 percent of the U.S. long-range cargo capacity, based on 1989 data.

Stage II activation increased the commitment to about 17 percent of the industries' long-range passenger capacity and 30 percent of its long-range cargo capacity.

(41) The percentage of the U.S. air fleet committed under Stage I and Stage II of the CRAF program implies a significant civil capability remains untapped. About one half of the wide-bodied aircraft that are used in overseas operations are part of the CRAF Program. (42)

The CRAF Program has the potential to be expanded through the in-place CRAF Enhancement Program and a modified program to provide military modifications during production. It is a minimal cost program to DOD when compared to organic aircraft procurement, annual maintenance and operations expenses, and crew training. Between August 1990 and February 11, 1991, MAC (inclusive of CRAF) flew 3.28 billion-ton-miles, compared to 89.7 million-ton-miles during the Berlin Airlift. (43)

Despite this record-setting airlift, sealift moved the vast majority of supplies and equipment. As of February 5, 1991, TRANSCOM had a total of 360 ship crossings. On December 31, 1990, the U.S. had a figurative steel bridge across the ocean, with 132 ships enroute to Saudi Arabia and 47 returning to the United States. That is one ship for every 50 miles from Savannah, Georgia to the Persian Gulf. (44) Fast sealift ships were activated August 10, 1990, with the first, the USS Capella, arriving in the theater August 27. The USS Capella carried the lead

brigade of the 24th Infantry Division and 5,328 short tons of equipment and supplies. (45)

The requirement for all legs of the mobility triad to complement the others is critical to the success of TRANSCOM's mission to support U. S. military strategic objectives. Airlift provides the rapid response forces and equipment while the sealift component transports the bulk of the equipment and supplies. The type of contingency or crisis determines the percent of the package each carries. Prepositioning of equipment sets and supplies reduces the burden on both airlift and sealift but is not capable in and of itself of meeting the equipment support demands as the U.S. shifts its focus from Central Europe.

The prepositioned equipment afloat provides some flexibility but is very costly to maintain. Portions of the 21st Theater Army Area Command (TAAACOM) European-based Prepositioned Material Configured to Unit Sets (POMCUS) and Theater Reserve (TR) Stocks were sent to the Persian Gulf. There were nearly six division sets of equipment stored in sites throughout Central Europe, as part of the U.S. commitment to NATO, when the Gulf Crisis erupted. The fate of these stockpiles is being reviewed as part of the overall reduction of forces and equipment in NATO. These stocks played a critical role in the Kuwait Theater of Operations (KTO) sustainment base. The prepositioned stocks afloat in the Indian Ocean were also used extensively to support operations in the Gulf. The DOD is studying potential locations where prepositioned stocks could reduce the initial demand on airlift and sealift in potential contingency areas vital to U.S. national interests. The costs and scope of the prepositioning program are also under review.

A review of the number of aircraft used during Desert Shield shows a low of 25 commercial aircraft on one day, but a high of 53 commercial aircraft during the CRAF Stage I activation period. The average, counting the CRAF participants and non-CRAF air carrier volunteers, was well over 40 per day during Desert Shield.

(46) In the 54 days between August 7 and September 30, the military and civil carriers together airlifted over 127,000 troops and 115,000 tons of cargo. This was a phenomenal accomplishment. During the initial surge portion of Desert Shield operations, over 90 percent of the operational C-141 aircraft and over 95 percent of the operational C-5 aircraft were committed. (47)

The Air Force experienced full employment of organic assets with one active theater of war. The worldwide commercial and organic peacetime support requirements had not lessened when the crisis was in the initial stages of buildup. The need for additional airlift assets from both the organic fleet and from the CRAF fleet is essential as we project future scenario requirements.

The important issue that masked the transportation system's capabilities shortfall remained the passivity of the Iraqis. The U.S. and its allies never were effectively challenged as they built up and supported military operations. The impact of in progress hostilities, a lack of prepared reception facilities, and interdiction of lines of communication during deployment were not experienced during Operation Desert Shield/Storm. The impact of any or all of the three can be evaluated using a variety of simulations. That level of analysis is beyond the scope of this monograph. What is clear, however, is the need for additional organic and civil airlift.

"We won't be able to do it as well as we did it in Desert Shield /Storm or,

probably, as fast," Admiral Frank B. Kelso II, Chief of Naval Operations, told a congressional committee. "Another thing is how long you could sustain it if you had to. The smaller you get, the harder it is to sustain anything over a long period of time." (48) Airlift needs for the future taken from the Persian Gulf War lessons learned are many. A major one is the requirement to expand the C-17 program -- not cut it back -- and proceed with an associated civil air carrier derivative with built-in military features.

IV. STRATEGIC MOBILITY FOR THE FUTURE

CRAF is not the only solution. Additional organic military airlift, primarily in the form of the C-17, is essential. But the CRAF program is the government's most cost effective means of immediately reducing this nation's cargo shortfall. (49)

The airlift requirements for the decade of the '90s were shaped by decisions made in the early 1980s. The Congressionally Mandated Mobility Study (CMMS) guided acquisition decisions and provided direction for the integration of the civil air carriers into the equation. What are the requirements for the year 2000 and the decade beyond? If you asked airlift planners five years ago, the requirements would have been relatively clear-cut and calculable based on the updated worst case Central European (NATO) threat-based scenario. The ability to forecast requirements today is not that clear-cut. The dissolution of the Soviet Union, the dissolution of the Warsaw Pact, and the reunification of Germany changed forty years of focused planning. The war in the Persian Gulf highlights the need for a flexible airlift capability.

"The airlift mission has never been more critical. There is no substitute for airlift when rapid response is the requirement. The U.S. must have a capability to rapidly project power to overwhelm the forces opposing the U.S. and its allies." Gen Carl E. Vuono, former Army Chief of Staff, told the Senate Armed Services Committee, "As the U.S. reduces its forward-deployed forces during the 1990's and increases its reliance on mobile forces based in the U.S., its airlift and sealift needs will increase." (50)

A balance in determining the complex airlift requirements must be struck

between organic capabilities of the Air Force and the capabilities of the civil air carriers in a rapidly changing international environment with a revised U.S. global strategy. Worldwide economic turmoil continues to influence the civil air carrier industry's forecasts for new airframes. It also influences forecasting their ability to support the U.S. global strategy.

The most difficult problem facing airlift planners is determining total strategic and tactical airlift requirements. They must know how much capacity is needed, what type of cargo is to be transported, and the physical dimensions of the cargo to determine the type and number of aircraft to be used - bulk, oversized and outsized. (51) Outsize cargo can only be carried by the largest current organic aircraft in the Air Force's inventory, the C-5A/B. The C-17, when it reaches full production, will become the heavy lift workhorse. Outsize cargo includes such things as artillery, tanks, and some helicopters.

Programmed airlift improvements call for increasing U.S. airlift capacity from the current 48 mtmfd to 55 mtmfd by 1994. While a worthy planning objective, it seems increasingly apparent that contingency operations require consideration of absolute numbers of capable airframes, as well as gross planning figures like million-ton-miles per day (mtmfd). (52)

It is unrealistic to assume that the U.S. military budget will, in the foreseeable future, be increased to allow the Air Force to acquire organic aircraft, personnel, and facilities to close the requirement - capabilities gap. This is where CRAF can play a vital and expanded role. (53) The DOD and the GAO agree that airlift obtained through CRAF is at least six times less expensive than acquiring

organic equipment (54). In a 1990 Rand Study, General Duane H. Cassidy, former TRANSCOM Commander-in-Chief, felt the DOD airlift goal of 66 mtnld would be reached by 1998 or the year 2000 with the completion of the 210 aircraft C-17 program. (55)

The C-17 was planned originally as a supplement to the existing fleet. The C-17 program was cut back in 1990 from the original 210 aircraft to 120 aircraft. This total would only maintain the current capacity as C-141Bs were retired. (56) The total airlift capacity in mtnld remains approximately the same from FY91 to FY95. Airlift capacity increases by as much as 14 percent from FY95 through FY99 as the more capable C-17s replaces a portion of the C-141 fleet, and then decreases as the C-141s reach the end of their service life and retire at the end of the century. (57)

Modernizing MAC, mainly by fielding the C-17 transport and beginning to retire C-141Bs, is a major MAC challenge for the 1990s. Development and production problems have caused C-17 delays and cost increases. MAC faces a temporary reduction in its projected airlift capacity even if the new aircraft can be acquired under the current schedule. The C-17 initial operating capability, originally scheduled to be met by September 1992, has now been slipped to the fall of 1994. The Air Force will have to start retiring aging C-141s regardless of the status of the C-17. This trough will grow if the C-17 experiences additional delays. (58)

MAC officials do not believe the CRAF program will grow beyond the current level of 517. MG James C. McCombs, MACs Deputy Chief of Staff for Plans and Programs, believes "It may shrink because six of the twelve largest airlines in the

U.S. have or are anticipated to go into bankruptcy of one form or another." (59) Airlift capacity at the end of the century will be 54 mmtmd if the current C-17 schedule holds and the C-141Bs last as long as expected. (60) The 54 mmtmd projected capability is far below the 1981 CMMS goal of 68 mmtmd. MAC force levels will be cut back less than the roughly 25% assumed for the Air Force as a whole. Decreases in airlift capacity that will result from mid and late 1990's retirement of the C-141B transports are to be offset by the scheduled introduction of the C-17. (61)

The CRAF capability needs to be able to augment and take up the gaps formed by the cutbacks and delays in the C-17 program. MAC is continuing to pursue the capability potential the CRAF offers. Some of the cargo shortfall can be satisfied with aggressive action taken to stimulate the development of the U.S. civil air carrier industry. Stimulation of the U.S. aviation industry meets one of the stated goals of the 1987 U.S. Airlift Policy. Interestingly, while the U.S. market share on a worldwide basis for commercial passenger operations was approximately 65 percent in 1990, it was only 36 percent on the commercial cargo side. (62) The worldwide cargo market share shortfall, especially that of the long-range international fleet, is particularly distressing.

One aerospace manufacturer estimated in 1990 that the market for new commercial aircraft would be worth an estimated \$450 billion between the previous year, 1989, and the year 2005. Most of that will be for U.S. carriers - all at no cost to the taxpayer. (63) The versatility and cost effectiveness the CRAF program provides are its most attractive features. Most projections show the CRAF capability in support of the DOD remaining flatlined to and beyond the

year 2000. It is important for the DOD to work closely with the air carriers and aircraft manufacturers to negotiate the inclusion of military features in all new production.

Today there is little incentive for military features to be included in design and manufacture. Careful planning is required when determining the force structure requirements of the Air Force and the makeup of the civil air carrier fleet. New airline purchases are significant investments for an air carrier. Aircraft are expected to remain operational for approximately 30 years once they enter the force structure. It has been established that the U.S. will almost certainly have a continued airlift shortfall as we reach out to the year 2000. Consequently, the other legs of the mobility triad take on additional weight and responsibility.

The health of our maritime forces is worthy of a short review. The U.S. sealift capacity available to respond to a crisis is a critical part of the mobility equation. The total dry-cargo sealift capacity will decrease by 31 percent between FY91 and FY99 because the total number of dry-cargo ships in the U.S. Merchant Marine fleet will decline from 248 in FY91 to 126 in FY99. (84) (See Appendix D)

The U.S. has a critical need for additional Fast Sealift Ships (FSS). One healthy leg of the mobility triad cannot meet the increased demands of an unhealthy one. The triad should have a synergistic effect on the overall transportation system. As previously discussed, airlift provides the rapid response, sealift provides the bulk of the heavy equipment and sustainment forces, while sufficient levels of prepositioned stocks reduces the demands on the other two legs.

Force reductions planned through 1999 will decrease capability, create an image of U.S. global withdrawal, and potentially reduce U.S. influence. (65) The ability to rapidly deploy forces remains one of the cornerstones of U.S. military strategy. It is the new U.S. conventional deterrent with the reduction in forward deployed troops. The smaller, continental, U.S. based force structure and the changing military strategy have not reduced the requirement for airlift or sealift. In June 1990, the Army planned a reduction from a 5 corps, 28 division force to a 4 corps 23 division force by the mid-1990s. The plan was revised downward in February 1991 to a 4 corps, 20 division force by the mid 1990s. (66) The 20 division force is by no means assured with a vague threat, a weak U.S. economic outlook, and the 1992 national elections in the offing.

To meet U.S. defense requirements, the Army requires the capability to move two armored divisions and their support to a theater of operations anywhere in the world in about 30 days; the remainder of an entire corps must follow in about 75 days. The Army supports expanding the current fleet of immediately available Fast Sealift Ships and improving the Ready Reserve Force with modern Roll-On Roll-Off ships. (67) Closely tied to support for Fast Sealift is the Army's unwavering support for the C-17 program. The C-17 and a reenergized civil aviation industry, particularly the cargo market, are the two most viable means of minimizing the strategy - capabilities shortfall as we approach the year 2000.

V. STRATEGY - CAPABILITIES MISMATCH

The nature of U.S. interests around the world, our coalition-based strategy, and the vagaries of the international environment will require that U.S. forces be globally deployable, often with little or no warning, from the U.S. and from forward bases. (68)

The C-17 program has been discussed throughout this paper as the linchpin to strategic airlift capabilities for the late 90s and well into the 21st century. The Airlift Master Plan (AMP) shows the C-17 is cheaper and saves manpower spaces over comparable airlift options plus gives an "austere field" capability that other airlift alternatives cannot. The C-17 is the system to get theater commanders the airlift they need. (69) The C-17 will be an intertheater asset and an intratheater asset. The inter-intratheater prioritization mix becomes critical with reduced procurement. It will allow delivery of forces directly from CONUS to the final destination airfield - bypassing the interim airfields. Direct delivery to destination is not a "nice-to-have" capability, it is an ever increasing military necessity. (70)

The C-17 is the first cargo aircraft specifically designed to have the inter-intratheater capability. The ability of the C-17 to fly to the destination rather than to the intermodal or transload location for onward movement to the final destination is a capability that is in-line with current strategic requirements. The quality and location of airfields in most regions outside Europe normally limit airlift flexibility. The C-17's ability to operate from small, relatively underdeveloped, forward airfields improves rapid response times for contingency

forces and expedites critical sustainment supplies. The aircraft has a large outsize lift capability. It has the capacity to lift a maximum of 83.2 tons of cargo at a speed of 518 mph. (71) The C-141 can transport a Light Infantry Division using approximately 481 C-141B sorties in about seven days. This same division can be transported in a little over 300 sorties in about 3.3 days using the C-17. (72)

The C-17 is cost effective, but an expensive system just the same. The original C-17 program called for delivery of 210 aircraft by 1998-2000 at an estimated cost of \$37.7 billion. (73) The buy, as indicated earlier, has been cut to 120 airframes. One of the reasons for the reduction is that the system has been plagued by a myriad of cost problems that now appear to be under control. These cost concerns and current and projected DOD budgetary constraints have cut deep into the future strategic lift capability of the U.S. Air Force.

A variety of options were analyzed by MAC in deciding the retirement plan for older systems and the procurement plan for the C-17. As an example, the 1988 U.S. Air Force Master Plan called for retiring 54 C-141s plus 180 older C-130s and transferring 80 C-141s to the reserve forces. In this option, 180 C-17s were planned to be acquired to contribute towards strategic and theater requirements. This option would have brought the mid capability to the 66 mid strategic lift goal. (74) Unfortunately, that goal will not be met by the year 2000. (See Appendix A.)

The C-17 is the key to reducing the strategic mobility strategy-capabilities mismatch. The DOD should continue to include the program as a high budget priority. It provides a capability to support the United States National Security

Strategy that no other system has. The program buy should be reevaluated in light of the refocused National Security Strategy. We will not be able to meet the 66 mtnld goal by the year 2000 but we don't want to lose any current capability as the strategic airlift fleet is modernized. The C-17 program alone cannot meet the challenges and demand for airlift at the end of the decade. The DOD must energize the CRAF system to take advantage of a low cost alternative to organic airframes.

The CRAF program provides a valuable contribution to our mobilization capacity. CRAF does not compete with the organic fleet - it complements it. When commercial airlift assets - aircraft, crews, and operating bases - are reflected in strategic plans through the CRAF program, the government realizes significant savings and cost avoidances in the areas of hardware procurement, crew training, base support, and operations and maintenance cost. (75) MAC must be willing to continue its dialogue with the civil air carriers to find ways to increase civil participation in the strategic airlift equation. It may be possible to reallocate greater portions of the MAC fleet to the Air Reserves and the Air National Guard units. The Air Force could make greater use of advanced flight simulators to maintain pilot proficiency and to reduce operations and support costs of long haul channel lifts now generated by training missions.

Commercial air transport augmentation could be utilized for cargo and passenger channel missions which now utilize organic MAC aircraft. (76) This increased access to diminishing channel requirements would be an incentive to civil air cargo carriers to join or to expand their participation in the CRAF program. Civil air cargo carriers would also have the potential to expand their

overseas market share by combining military and civil cargo on the transoceanic channels. Some airline executives estimate their industry's revenues from MAC -- currently about \$700 million per year -- will decrease by more than half during the next few years. (77) The assurances of scheduled air cargo routes would stimulate the entire air cargo industry. If airline access to MAC peacetime business is not increased, civil air carrier participation in CRAF will decline at the exact time we need to have an increased reliance on them.

CINCTRANSCOM has speculated about shifting some of MAC's channel airlift-scheduled service to specific locations -- from its own fleet to the commercial carriers during the 90s. (78)

The CRAF Enhancement Program is a program with unlimited potential. The CRAF is constrained in attracting airlines to commit suitable aircraft because of contracting limitations. Although 23 aircraft have been converted to CRAF "CombI" aircraft, the first B-747 passenger aircraft took about ten years of negotiation. (79) The costs incurred with the CRAF Enhancement Program are one-time costs, while the option of government ownership incurs annual costs. The lowest cost CRAF option is where the government pays up to 50% of the additional manufacturing or modification costs because the airline chooses to use the aircraft's main deck cargo capability in peacetime. (80)

The CRAF Enhancement Program has been a relative success after a slow start. It must receive continued emphasis to get manufacturers to design in military features to new aircraft and to develop slide-in off-the-shelf deployment packages for rapid installation of military specific equipment in the event of another CRAF activation. The CRAF program on the whole needs little financing.

It does, however, need continued and expanded funding if it is going to continue to add civil cargo capability to the CRAF. (81) A study completed in 1988 stated that the total expense to the U.S. Government of adding the capacity of fifteen 747 freighters through the CRAF Enhancement Program is significantly less than the acquisition costs alone of adding two C-17s to the Air Force's organic fleet. A more cost effective method of meeting defense requirements is difficult to conceive. (82) All of the sources I researched indicated that the CRAF Enhancement Program is scheduled to remain steady through about 1993 but will not increase.

The search for attractive incentives is an ongoing process. The four key incentives: the CRAF Enhancement Program, Joint Ventures, Multiple Year Contracts, and the Senior Lodger Arrangement need to be expanded to make enrollment in the CRAF program more attractive. The future program will be revised in at least six ways:

1. Operational flexibility will be increased.
2. The Senior Lodger Arrangement will be improved.
3. Aeromedical aircraft will be added as part of the initial deployment.
4. Crew requirements will be modified.
5. The War Risk Insurance Program will be simplified.
6. The National Defense Features Program will be revitalized. (83)

The airline industry works closely with MAC to come up with innovative incentives. During the Gulf War, several air carriers expressed concerns with the initial employment of some CRAF aircraft. They stated they committed aircraft to DOD when the CRAF Stage I and II were activated rather than when they were notified of a mission. Some airlines had taken aircraft off their assigned commercial rotation in anticipation of Air Force directed CRAF utilization that was not forthcoming. The problem was solved quickly by attentive MAC operations

personnel. Some carriers want MAC to pay wartime rates for aircraft called up in Stages I and II. Currently, wartime rates are paid only in Stage III. (84) MAC has created a package that essentially guarantees airlines a certain number of flying hours once CRAF aircraft are activated. MAC also plans to adjust cancellation clauses. MAC will expand the cancellation clauses out to 21 days from the current 7 days. (85)

U.S. Air Force installations provide an incentive in and of themselves. (86) They provide options for reducing air cargo traffic density in some regions of the country and expanding traffic to other areas. The idea of opening up these airfields for joint-use operations is similar in concept to Air Force operations at Rhein Main AFB in Frankfurt, Germany. In Frankfurt, the U.S. Air Force operates half of one of the world's busiest airports with no apparent detriments to either civil or military operations. The relationship is very symbiotic. It could prove to be a big incentive to the courier or freight service industry. MAC benefits by adding critical cargo aircraft to the CRAF program. Joint use opens a market that previously may not have been serviced by any overnight package carrier or freight hauler and provides a base of operations for the air carrier that previously was only at a more centralized hub airport.

The CRAF Enhancement Program costs the air carriers money, even with MAC compensation. Some air carriers have recommended they be provided tax incentives for their contribution to strategic airlift. Federal matching funds should be used for acquisition of new wide-bodied cargo capable or convertible aircraft, modifications, service life extension plans, research and development programs, addition of military features - secure radio wiring, IFF, 463L pallet compatibility -

and routine day-to-day costs of CRAF participation. (87). Although not technically an incentive, MAC wants to alter the mix of cargo aircraft and passenger aircraft in CRAF Stage I and II, so they are more evenly balanced. Specifically, officials are looking at increasing the percentage of cargo aircraft in Stage II. Currently there are no aeromedical evacuation capable aircraft available until Stage III. (88)

The formula for awarding MAC points for aircraft needed to provide significant increases to cargo capability should be readjusted. The mobilization value of convertible aircraft should be increased. (89) The CRAF incentives are designed to encourage civil air carriers to voluntarily support DOD in the event of an emergency that exceeds the organic capability of MAC.

The changing international business environment has altered the face of many of America's industries. The diversification of industry and the expansion of companies outside one border has also impacted the airline industry. Foreign ownership (interest) of companies in the airline industry has become commonplace. Seventy-five percent of U.S. airline stock was required by law to be held by American citizens. This law restricted the level of common stock interest to less than 25 percent by foreign individuals or companies. The previous Transportation Secretary, Samuel K. Skinner, refined the foreign ownership policy by stating that the U.S. will tolerate foreign investment up to 49.9 percent of total equity. (90)

The issue of foreign ownership (interest) of air carriers has raised the level of concern on the responsiveness of a non-U.S. influenced carrier, particularly if the reason for activation of CRAF was not in the best interests of the major

shareholders. The question of foreign ownership did not surface as an issue during Operation Desert Shield/Storm but has been raised since. It is unreasonable to assume that an airline that has 49.9 percent foreign ownership would not be influenced by recommendations made by the foreign shareholders. The foreign ownership issue is outside the purview of DOD. It is not in and of itself a problem. It would be a step into the business dark ages and a strike against free enterprise to think we could revert to pure national ownership of any company that chose to expand into international ownership. Congress should pass legislation that would ensure that foreign ownership would not reduce responsiveness to a call for support in the event of a CRAFT system activation or worse yet block voluntary participation in the program. This is an issue that needs to be addressed as more and more financially stressed companies seek outside financial support to bolster their sagging businesses.

A healthy civilian air carrier market is the life blood of the cargo augmentation support to MAC. The aerospace industry is looking for market alternatives now that the aerospace defense industry is in jeopardy. Whatever happens with the McDonnell Douglas C-17, the Air Bus 340, or the Boeing 747, what remains clear is that the demand for freighter aircraft will grow. (91)

The C-17 program once again is a good example of the uncertainty that plagues the aerospace industry – the reduction of 210 airframes to 120 airframes. The problem is that defense contractors who win major contracts have tremendous up front capital expenditures for retooling and new factories. McDonnell Douglas, because of the C-17 cutbacks, is left with a plant designed to build 29 aircraft annually but the revised program only calls for production of

18 annually, at peak rates. (92)

The development of a civilian derivative of a military cargo transport is one that is always of interest to the defense aerospace industry. It lowers their overall production cost per airframe and keeps the production line moving. Air carriers and the prime contractor could negotiate with the DOD for a mixed production line. This has the potential of adding a significant capability to CRAF at the same time its adding organic capability to MAC. This is also an initiative that stimulates the civilian airline industry.

Airbus is offering A340 freighter versions to compete with the McDonnell Douglas MD-11. In a combi version, the A340 could carry 220 passengers plus 100,000 lbs. of cargo a distance of 7,400 kilometers. This is a step toward a A340 dedicated freighter, which could be available near the end of the decade. The A340F could carry about 175,000lbs. at ranges of more than 7,400 kilometers. (93) It would be 1998 before a civil aircraft version of the C-17, the MD-17F, is ready even if the questions of customer demand and government participation in a commercial C-17 production were answered today. If military construction continues as scheduled, the company will have delivered 33 C-17's including one test aircraft. (94)

There are ways to cut costs in the production conversion to a civilian freighter. The removal of military designed equipment and wiring would save an air carrier money but in the long run it may be wise for DOD to absorb the costs associated with military specific equipment to have an aircraft that is "mission ready" when CRAF is activated. A healthy airline industry will become an indicator of the health of strategic airlift in a downsized Air Force.

VI. CONCLUSIONS

I conducted all my research using only open source documents. The following conclusions can be drawn from my research:

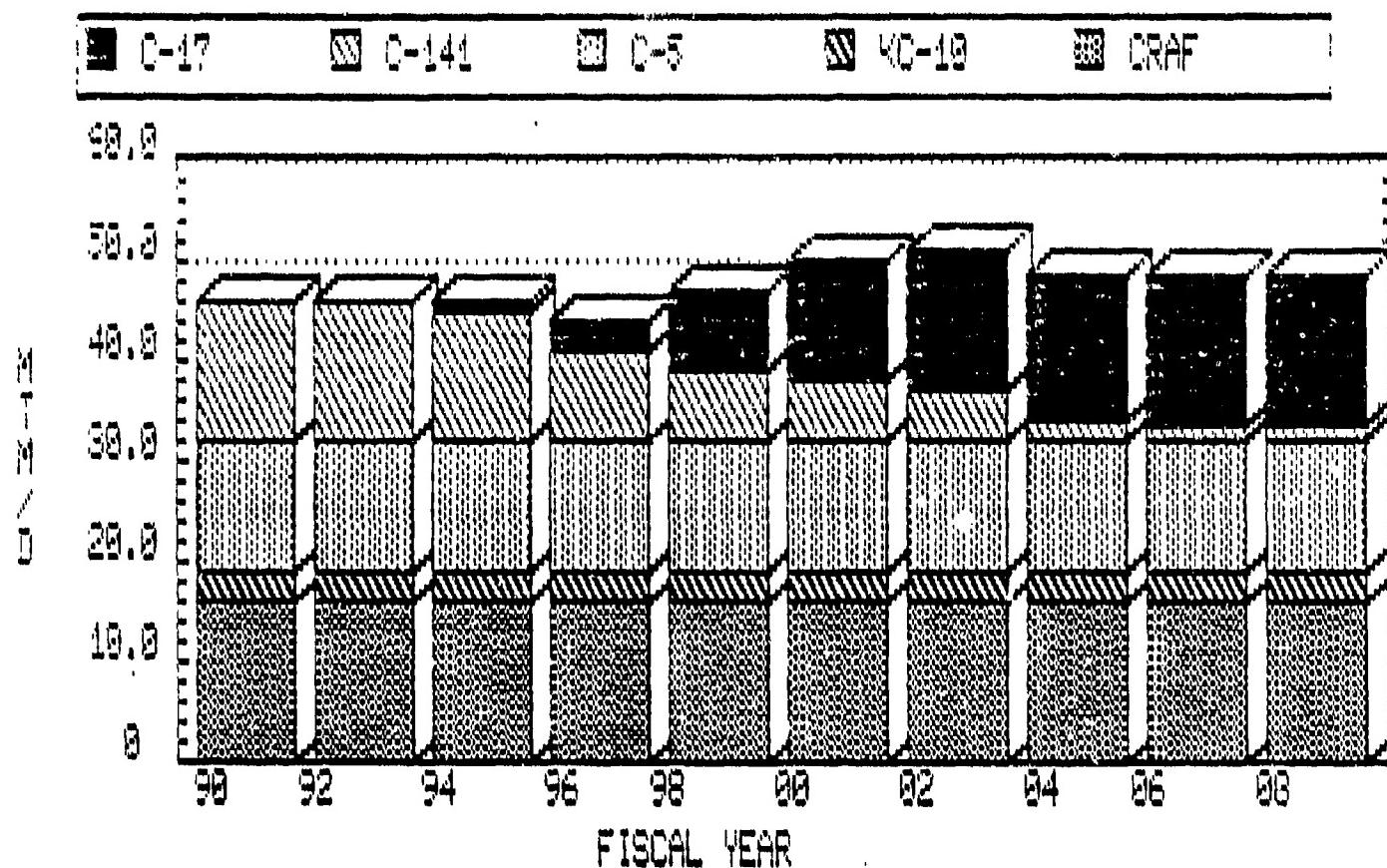
1. The Strategic Airlift System is a well-managed TRANSCOM program.
2. The C-17 is the critical system around which the rest of the airlift system must be designed. Mixed production lines to increase civil market access to a large freighter during the 1990s need to be implemented.
3. The CRAF concept is a proven performer after 40 years of being an untested on-the-shelf program. The program had remarkably few problems during the spin-up to Operation Desert Storm. Those that did surface were quickly dealt with.
4. MAC, primarily for parochial reasons – force structure and force modernization – has tended to look internally to develop organic capabilities rather than to actively develop a civil alternative. This will be a major reason for the strategy-capabilities mismatch by the year 2000 and beyond.
5. CRAF, as a program, needs enhancing to meet the intent of the National Airlift Policy objectives to revitalize the U.S. aviation industry and to increase the U.S. air cargo industry marketshare.
6. MAC should reduce the impact of downsizing by redistributing organic airlift capability to the Air Force Reserve and Air National Guard and rely more on the CRAF capability for channel missions. This is a hard recommendation to consider for active duty force planners but one that is needed if it serves the goal of increasing the strategic cargo capability.
7. Strategic airlift capacity will continue to fall below established goals in a decade of increasing demand for responsiveness.

Strategic airlift is the linchpin of the new U.S. National Security Strategy. The U.S. will have a strategy-capabilities mismatch unless the Department of Defense provides increased priority to the mobility triad. Reducing airlift goals to meet proposed capabilities without modifying the strategic requirements will add an unacceptable degree of risk in a very uncertain world. Potentially

draconian cuts in near term sealift haul capacity and uncertain strategic airlift retirements and modernization will adversely affect lift apportionment. The successful execution of war plans and worldwide contingencies is at stake. A robust CRAF is a cost-effective partner in the mobility triad. Its contribution potential must be exploited to expand and stabilize strategic airlift mobility capacity into the next decade.

Appendix A : Strategic Airlift Capability

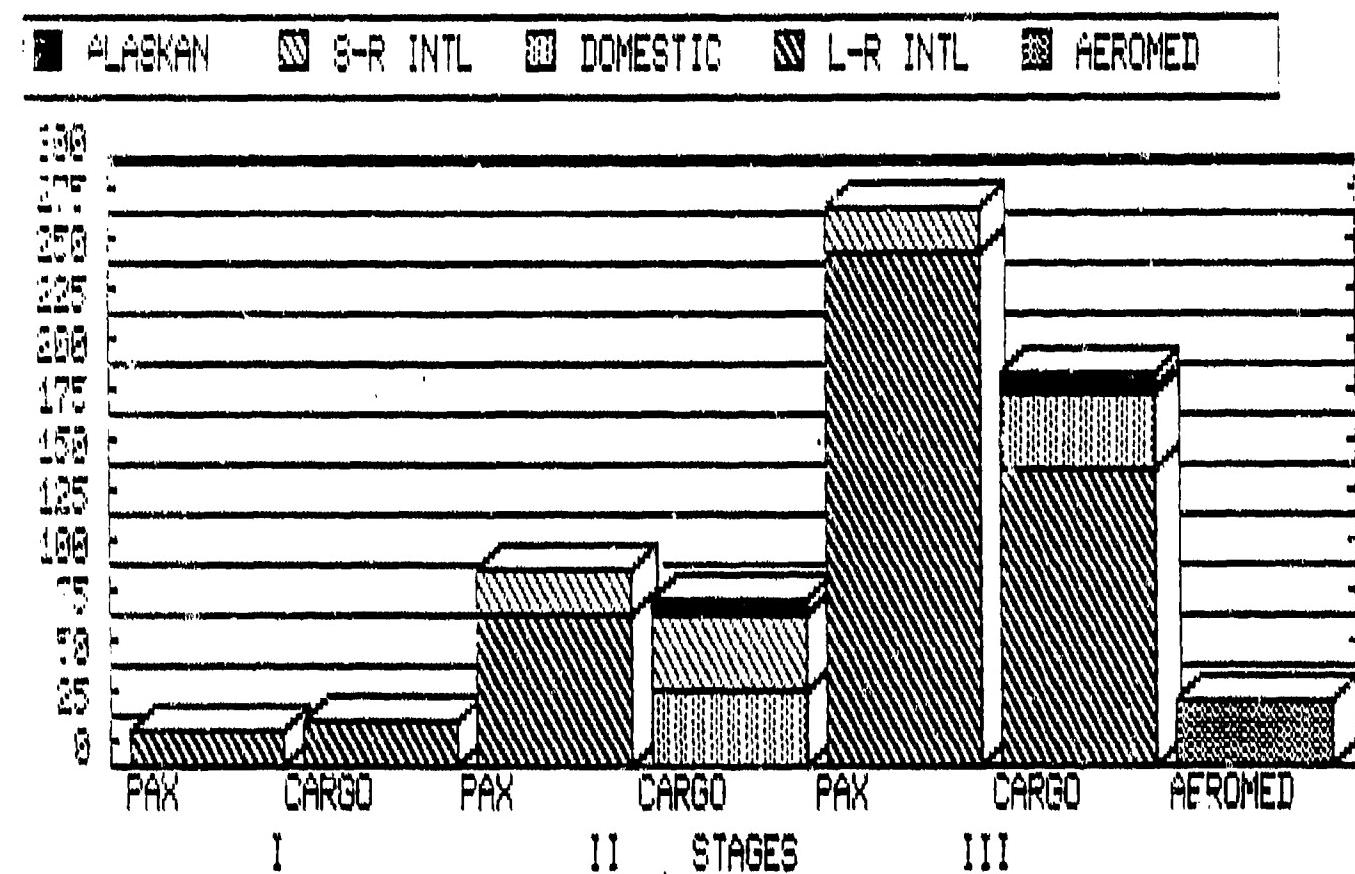
STRATEGIC AIRLIFT CAPABILITY



SOURCE : Aviation Week and Space Technology, September 9, 1991

Appendix B : Civil Reserve Air Fleet

CIVIL RESERVE AIR FLEET (CRAF)



SOURCE : Aviation Week and Space Technology, September 9, 1991

APPENDIX C : COMMERCIAL AIRLINES PARTICIPATION IN DESERT SHIELD/STORM

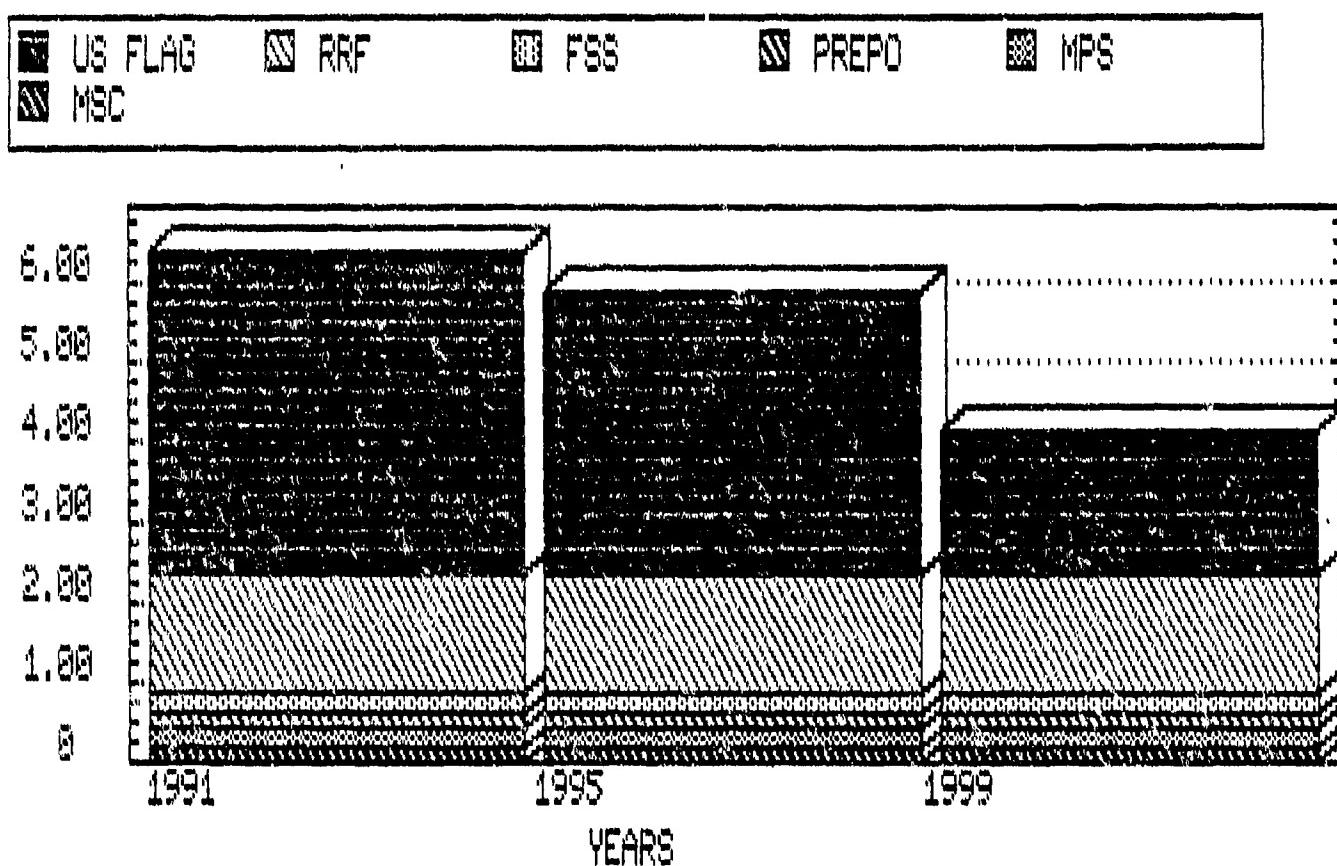
AUG 7, 1990-JUNE 30 1991

U.S. CARRIERS*		MIS SIONS	CARGO
		PASSENGERS	
Air Transport International	—	156	
American Airlines	98	—	
American International Airways (formerly Connie Kalitta Services)	—	370	
American Transair	404	—	
America West Airlines	39	—	
Arrow Air	—	119	
Buffalo Airways	—	22	
Continental Airlines	91	—	
Delta Airlines	28	—	
Eastern Airlines	33	—	
Emery Worldwide	—	152	
Evergreen International Airlines	—	347	
Federal Express	29	576	
Flagship Express (formerly Rosenbalm Aviation)	—	249	
Florida West	—	54	
Hawaiian Airlines	283	—	
Northwest Airlines	268	117	
Pan Am	335	69	
Rich International Airways	14	—	
Southern Air Transport	—	252	
Sun Country Air Lines	30	—	
Tower Air	242	1	
Trans Continental Airlines	5	—	
Trans World Airlines	238	—	
United Airlines	177	—	
United Parcel Service	—	123	
World Airways	188	148	
Total U.S. Carriers	2,568	2756	
FOREIGN CARRIERS			
Alitalia	—	27	
Cargolux Airlines International (Luxembourg)	17	—	
Korean Air (S. Korea)	—	70	
Kuwait Airways (Kuwait)	—	1	
Martinair Holland (Netherlands)	—	16	
Total Missions All Carriers	2585	2870	

*Includes CRAF Members and Volunteers SOURCE: Aviation Week and Space Technology
8 Sep 1991

Appendix D : Sealift Capacity

STRATEGIC SEALIFT CAPACITY



SOURCE : 1991 Joint Military Net Assessment

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